

Coast Horned Lizard

(*Phrynosoma coronatum frontale*)



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Legal Status

Federal: None.

State: Species of Special Concern.

Global and State Conservation Status: G4SNR: Global Rank, G4 = Apparently Secure: Uncommon but not rare; some cause for long-term concern due to declines or other factors; State Rank, SNR = Unranked: state conservation status not yet assessed.

Recovery Plan: None.

Other Common Names: California horned lizard

Species Description and Life History

Coast horned lizards are large (60-105 mm snout to vent length), dorsoventrally flattened lizard with five backwardly projecting head spines (Jennings and Hayes 1994). Two parallel rows of pointed fringe scales line the side of the body (Jennings and Hayes 1994). Dorsal coloration varies but is typically gray, tan, reddish-brown, or whitish, and usually resembles the prevailing soil color (Jennings and Hayes 1994). The venter is yellow to white with discrete, dark spots (Jennings and Hayes 1994). Though Brattstrom (1997) concurs with Grismer and Mellink (1994) in concluding there are no valid subspecies of *P. coronatum* and that the names *frontale*, *blainvillii*, *jamesi*, *schmidtii*, and *cerroense* should be placed in the synonymy of *P. coronatum*, most current literature continues to divide the taxon into these five subspecific groups.

Coast horned lizards appear to have a life history similar to the related San Diego horned lizard (*P. c. blainvillii*) (Jennings and Hayes 1994). This diurnal species is most active mid-day during spring and fall, and during morning and late afternoon in mid-summer months (Zeiner *et al.* 1988). Activity has been observed between April and October with activity being more conspicuous in April and May (Jennings and Hayes 1994). Nocturnal activity may occur during particularly warm periods (Morey 2000).

In captivity, coast horned lizards have been observed to copulate in late April and early May (Banta and Morafka 1968) while courtship activities have been noted in the wild during April (Tollestrup 1981). Males may use elevated “viewing platforms” such as cow dung (Tollestrup 1981) to locate potential mates. Females lay a range of 6 to 16 eggs as reported by Stebbins (1954). Goldberg’s report of a May-collected specimen of female coast horned lizard with corpora lutea from a previous clutch and vitellogenic eggs for a second clutch suggests that this species has the potential to produce multiple

clutches (1983). Little information is available on the specific habitat requirements for breeding and egg-laying. However, eggs are apparently laid in nests constructed in loose soils and hatch after two months (Morey 2000). Hatchlings begin to appear in late July and early August (Banta and Morafka 1968). Studies on the related San Diego horned lizard suggest that 2-3 years are required to reach minimum size for sexual maturity (Jennings and Hayes 1994). Adult coast horned lizards are considered long-lived with captive individuals surviving more than 8 years (USFS 2008). However, data on longevity in the wild is lacking (Jennings and Hayes 1994).

Pronounced seasonal movement or migration has not been reported (Morey 2000). Habitat requirements, such as sites for courtship and display, egg-laying, and hibernation are apparently found within the area of normal activity (Morey 2000). There is little information on home ranges for the species. Males of a relative in Arizona, *P. solare*, used a larger area than females; the mean maximum distance between capture points was 30 m (98 ft) for males and 15 m (49 ft) for females (Beharav 1975). Studies on the San Diego horned lizard suggest that the species exhibits high site fidelity because effective temperature regulation requires familiarity with individuals' surroundings (Jennings and Hayes 1994).

Habitat Requirements and Ecology

Coast horned lizards occur in a variety of habitat types, including valley-foothill hardwood, conifer, riparian, pine-cypress, juniper, grassland habitats (Morey 2000), and open chaparral. Although this species may have historically survived in vineyards, this is probably no longer the case due to the manner in which vineyards are currently tended (Jennings and Hayes 1994). The species occurs below 600 m (2,000 ft) in the northern part of its range and 900 m (3,000 ft) in the southern part of its range (Morey 2000). Important habitat features include loose, fine soils with high sand fraction, abundance of native ant species, open areas with limited overstory for basking, and areas with low, dense shrubs for refuge (USFS 2008). Coast horned lizard populations reach maximum abundance in areas supporting sandy loam soils and on alkali flats often dominated by iodine bush (*Allenrolfea occidentalis*) (Montanucci 1968). Individuals will burrow in loose soil to escape extreme heat and predators (Morey 2000). Periods of inactivity and winter hibernation are spent burrowed into the soil under surface objects such as logs or rocks, in mammal burrows, or in crevices (Morey 2000).

Leopard lizards, sidewinders, striped whipsnakes and other snakes, loggerhead shrikes, and hawks have all been reported as predators of horned lizards (Morey 2000). This species relies on its cryptic coloration and motionless behavior to avoid detection by predators (Jennings and Hayes 1994). In addition to cryptic coloration, this species has other defense mechanisms to deter and avoid predation. When threatened, this lizard will inflate with air, increasing its size making it difficult to swallow. It will also open its mouth and hiss in an attempt to scare off predators. Finally, as a last resort, the species will spray blood several feet from sinus ducts routed to the corner of its eyes towards the potential predator.

Coast horned lizards are specialized to forage on ant species, such as harvester ants (Montanucci 1989). They do not appear to feed on non-native species, such as Argentine ants, that have been introduced to western United States and that have replaced native ants over much of central and southern California (Jennings and Hayes 1994, Suarez *et al.* 2000). Small beetles are also taken in large numbers when especially abundant (Morey 2000). In addition, coast horned lizards will eat wasps, grasshoppers, flies, and caterpillars (Stebbins 1954). Pianka and Parker (1975) concluded that because of their rather specialized diets, most horned lizards probably experience little competition for food from other coexisting lizards.

Species Distribution and Population Trends

Distribution

The coast horned lizard is endemic to California and occurs in the Sierra Nevada foothills from Butte County to Kern County and throughout the central and southern California coast (Morey 2000). The coast horned lizard intergrades with the San Diego horned lizard in southern Kern County and much of northern Santa Barbara, Ventura, and Los Angeles counties (Morey 2000).

Although Yolo County contains potentially suitable habitat and is within the range of this species, the distribution in of the coast horned lizard in Yolo County is unknown. Queries of the CNDDDB (2007) and the online databases of the California Academy of Sciences (2008) and Museum of Vertebrate Zoology (2008) yielded no records of coast horned lizards in Yolo County. Jennings and Hayes (1994) indicate an uncertain record in southern Yolo County near the City of Davis that is presumed extinct. The paucity of recorded occurrences suggests that the coast horned lizard may never have been a common species in Yolo County.

Population Trends

The coast horned lizard has disappeared from approximately 35% of its range in central and northern California and extant populations are becoming increasingly fragmented with continued development of the region (Jennings and Hayes 1994). Agricultural development in the Central Valley has adversely affected this species. Although individuals may continue to be observed for some years along the fringes of agricultural developments, this is likely a result of longevity, and the species seems inevitably to disappear after several generations if the edge habitat is altered, or its food resources are reduced due to pesticides or habitat takeover by Argentine ants (Jennings and Hayes 1994). The taxon remains abundant only in localized areas along the South Coast Ranges and in isolated sections of natural habitat remaining on the San Joaquin Valley floor (Jennings and Hayes 1994).

The principal factors contributing to the decline of the coast horned lizard are loss of habitat due to urban development, conversion of native habitats to agricultural lands, introduction of non-native ant species, and pesticide use (Jennings and Hayes 1994).

Habitat loss and fragmentation result in small, isolated populations, which reduce individual movements and genetic exchange between populations. Reduction in gene flow can result in inbreeding depression and reduced population fitness.

Threats to the Species and Other Conservation Issues

Habitat loss and fragmentation threatened the long term survival of the coast horned lizard. Specifically, in the Central Valley the conversion of a large percentage of the historical habitat of the coast horned lizard from relict lake sand dunes and alluvial fans to agriculture, and to a lesser extent other development such as pipelines, canals, and roads, has resulted in the disappearance of this taxon from many areas (Jennings and Hayes 2000).

Invasion of non-native ant species poses a significant threat to the coast horned lizard (Stephenson and Calcarone 1999). The introduction of Argentine ants has resulted in the displacement of the native ant food base (SDNHM 2008). Experiments show that horned lizards reared solely on Argentine ants and the arthropods typical of an invaded community show negative or neutral growth rates, suggesting that horned lizards are disappearing from habitat remnants at least in part due to the deterministic effects of biological invasion (Suarez and Case 2002). Additionally, the recent arrival of non-native red fire ants could have a similar detrimental effect on the native ant food base (Stephenson and Calcarone 1999). Finally, domestic cats are also known to threaten coast horned lizards (Jennings and Hayes 1994). Domestic cats have been observed to eliminate horned lizards within a several km² area from a cat's home base (Jennings and Hayes 1994).

Extensive surveys and studies of this taxon are needed. In addition to studies of impacts of domestic pets, the invasion of Argentine ant, and non-native red fire ants into remaining suitable horned lizard habitat should be monitored. Reserves should be managed to prevent the penetration of Argentine ants to reduce the direct and indirect of natural communities supporting the species (Suarez *et al.* 2000). Additionally land-use practices such as livestock grazing, off-road vehicle use, and prescribed burning that are potentially detrimental to coast horned lizard survival are needed to determine appropriate management. Proper management of this taxon also requires detailed studies of its movement ecology and colonization abilities. Although systematic revision of this taxon and its relatives based on morphology are suggested, phylogenetic studies are also needed validate the taxonomy.

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